20. *Notes on South African Marine Fishes.*—By K. H. Barnard, D.Sc., F.L.S., Assistant Director.

(With Plates XXIII–XXV and 7 Text-figures.)

This paper continues that published in February 1934 (Ann. Mag. Nat. Hist., ser. 10, vol. xiii, pp. 228–235), and contains two new records; the description of a new genus and species of Clinid; an account of certain anatomical features of *Rhineodon*; and notes on pug-headedness in a species of *Pagrus*, and on an abnormal specimen of *Mola* and on the gill-filaments of this genus.

Apogon orbicularis C. and V.

1873. Günther, Fische d. Südsee, vol. i, p. 22, pl. 20, fig. D.
1878–88. Day, Fish. India, p. 65, pl. 17, fig. 7.
This well-known Indian species has been received from Mozambique.

Dascyllus aruanus Linn.

1877. Bleeker, Atl. Ichth., ix, pl. 409, fig. 6 (*Tetradrachmum arcuatum*).
1876–81. Günther, Fische d. Südsee, vol. ii, p. 235, pl. 124, fig. B.
1878–88. Day, Fish. India, p. 381, pl. 80, fig. 6.
Also received from Mozambique. The colour pattern resembles that of Günther's figure.

Fam. CLINIDAE.

Climacoporus n.g.

Resembling *Clinus* and *Clinoporus*. Hook on inner margin of shoulder-girdle present. Body densely covered with minute scales, distinctly imbricate only on posterior half of body. Anterior nostril shortly tubular. A palmate supraorbital tentacle. Head naked, pores mostly in double rows. Lateral line a broad, well-marked

canal opening by paired pores, the upper and lower pores opposite one another (not alternate as in *Clinoporus*), and joined by a slight cuticular ridge, thus resembling a ladder.

Climacoporus navalis n. sp.

(Text-fig. 1.)

Body elongate, moderately compressed. Depth $5\frac{1}{3}$, length of head 4, in length of body (caudal excluded). Eye slightly greater than

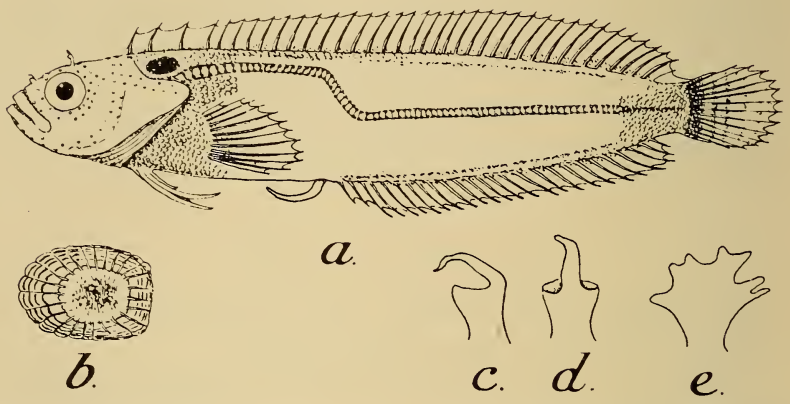

Fig. 1.—*Climacoporus navalis* n.g., n.sp. *a*, whole animal, scaling on body only partly indicated. *b*, scale. *c*, *d*, left anterior nostril from the side and from behind. *e*, left supraorbital tentacle from behind.

snout, 4 in length of head. Profile of head slightly convex. Anterior nostril shortly tubular, with a short filament arising from hind margin of rim; posterior nostril slightly larger than the head pores, but scarcely tubular. A transversely flattened, palmate supraorbital tentacle. Maxilla reaching to vertical from anterior third of eye. A band of smaller teeth behind the front row in both jaws, and a curved band on vomer. Branchiostegals 6. Gill-rakers 5–6 on lower part of anterior arch, very feeble. D XXXVII 1, beginning above hind edge of pre-opercle, spines increasing in length up to about the 30th, the first 4 more widely spaced than the others, especially the 2nd and 3rd, and 3rd and 4th, the single ray connected by membrane with the base of caudal fin. A II 24. P 12. V I 3, 3rd ray minute. C 15 (13 main rays). Lateral line with 77 pairs of pores, 24 to the downward curve, 10 on the bend, which occurs between the verticals from the 12th and 14th spines, and 43 on the straight hinder part,

which ends in 1–2 single pores at the vertical from the 35th spine; a slight groove, covered with ordinary scales, continues to base of caudal.

Length.—64 mm.

Colour.—Reddish or maroon-brown, with faint darker blotches appearing after preservation, an oval dark ocellus with pale border between origin of lateral line and 2nd-3rd dorsal spines, a dark band across base of caudal, followed by 2 narrower bands and a few irregular spots, margin of anal fin pale.

Locality.—Simonstown, False Bay, collected off the training ship *General Botha* on entering the naval dry-dock (16th June 1933, 1 ♂, K. H. B.).

Rhineodon typus A. Smith.

(Plates XXIII–XXV and Text-figs. 2, 3.)

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 37 (*Rhinodon typicus*).
1930. White, Bull. Amer. Mus. Nat. Hist., lxi, p. 129.
1931. Gudger, *ibid.*, p. 613.
1933. *Idem*, Nature, No. 3336, p. 569.
1934. Barnard, *ibid.*, No. 3376, p. 66.

A specimen, approximately 20 feet in total length, was found washed up on the beach at Kommetje, on the west side of the Cape Peninsula. It was stated to have been found at Easter (April 2nd) 1934, but unfortunately was not reported to the Museum until three weeks later. On 23rd April my colleague Dr Lawrence and I examined the specimen, and on the following day we cut off the upper half of the skin and the whole of the head, tail, and pectoral fins. Owing to hot dry weather the upper exposed parts were more or less mummified, but the lower surface was badly decomposed and impossible to save.

On arrival at the Museum Mr. Drury, the taxidermist, decided against mounting the remains of the skin. The best portions of the skin, however, were dried, and the fins and certain parts of the head were preserved for anatomical study.

White (1930, p. 157) has indicated three anatomical features requisite for forming a correct idea as to the true systematic position of the whale-shark, viz. the presence or absence of oro-nasal grooves, the rostral cartilages, and the pectoral fin. All these have been studied on the present specimen.

Some of the more important measurements may be given for comparison with other specimens:

	ft.	in.
Length, total	20	—
Tip of snout to origin of 1st dorsal	8	8
,, ,, ,, 2nd ,,	12	5
,, ,, root of tail	14	10
Base of 1st dorsal	1	6
,, 2nd ,,	—	8
Upper caudal lobe	5	2
Lower ,, ,,	3	—
Span between tips of caudal lobes	5	6
Pectoral (anterior base to tip)	3	—
Width around snout, eye to eye	4	—
Width across forehead, eye to eye	3	6
Width at bases of pectorals, over shoulders	4	8
Eye to 1st gill slit	2	1
,, 4th ,,	3	5
Eye (hind margin of) to spiracle	—	$3\frac{3}{4}$
Eye diameter	—	1
Spiracle	—	$1\frac{1}{4}$
Width of mouth	2	4
,, lower dental band	1	10
,, upper ,, ,,	1	$2\frac{1}{2}$
,, tongue	1	$1\frac{1}{2}$
Centre of upper jaw to nostril	—	10
Nostril to eye	1	—
,, angle of mouth	—	$5\frac{1}{2}$
Eye to angle of mouth	—	7
Lower end 5th gill-slit to hind corner pectoral fin	1	10
Caudal peduncle (at root of tail) vertical diam.	—	$6\frac{1}{2}$
,, ,, ,, ,, horizontal diam.	—	5
,, ,, width of keel	—	1
Tip of snout to origin of mid-dorsal keel (which is approx. at vertical from 1st gill-slit)	3	—

Length of 1st–5th gill-slits, resp. 15, 16, 17, 15, $12\frac{1}{2}$ inches.
Distances of upper ends of gill-slits to mid-dorsal line, respectively $12\frac{1}{2}$, $11\frac{1}{2}$, $10\frac{1}{2}$, $10\frac{1}{2}$, $11\frac{1}{2}$ inches.
Distance apart, each pair of gill-slits $4\frac{1}{2}$–5 inches.

From these measurements Mr. Drury has constructed a half-size model for exhibition in the Museum (Pl. XXIII). For purposes of this construction Mr. Drury studied Gudger's 1931 paper with the photographs and drawings there given of the known mounted specimens. He noticed a very definite discrepancy between the photographs of the *model* in the American Museum (pls. 23, 24), and those of the other specimens mounted or figured, viz. the relation between the pre-pectoral and post-pectoral lengths. In the American Museum

model the post-pectoral length (posterior base of pectoral to root of caudal) is three times the pre-pectoral length (tip of snout to anterior base of pectoral); in Bean's figure (Gudger, *loc. cit.*, pl. 28) and the sketch of the Tokyo specimen (*loc. cit.*, fig. 4) it is $2\frac{1}{2}$ times. In all the other figures the post-pectoral length is only twice the pre-pectoral length, though the British Museum mount (*loc. cit.*, pl. 31) shows it slightly over twice, the posterior part of the body having apparently been too much stretched out in mounting. The pre-pectoral length is approximately equal to the distance between the posterior base of pectoral and the ventrals. Our present specimen corresponds with Smith's original figure (1849), which remains far and away the best representation (photographic or otherwise) yet given of this shark.

On the other hand, this specimen differs from all the figures, including Smith's, which show the position of the 4th gill-slit. Instead of this gill-slit being over the base of the pectoral, *i.e.* with the pectoral arising below and in front of it, here it is definitely in front of the pectoral origin and extends below it in a ventral direction. The above given measurements of the lengths of the gill-slits and their distances from the mid-dorsal line indicate the position. See also Pls. XXIV and XXV.

Cephalic Mucus Canals.—Where these could be traced, they run as in the accompanying diagram (fig. 2). The aural canal is about 18 inches from the end of the snout, and about 15 inches in front of the level of the 1st gill-slit. At the latter level the lateral line is 6 inches from the medio-dorsal keel; it curves below the forked dorso-lateral keels and at the level of the 1st dorsal fin is about 16 inches from the centre line. A portion of the jugular canal was traced close below the spiracle, but the sub-rostral, nasal, and oral canals could not be traced owing to the decomposed condition of the skin. It is unfortunate that the oral canal could not be traced, as its completeness or incompleteness across the symphysis might help to determine the systematic position of *Rhineodon* (see Garman, 1888, Bull. Mus. Comp. Zool., xvii, 2, pp. 68, 72).

Oro-nasal Grooves (Pl. XXV).—Dr. White (*loc. cit.*, p. 153) states that the nostril is not truly confluent with the mouth, and that the upper lip is not divided into three parts, but adds that further investigation is required. The figure she gives is not too clear. A photograph of the nostril and portion of the jaw is here given, which fully confirms Dr. White's statement that oro-nasal grooves are absent.

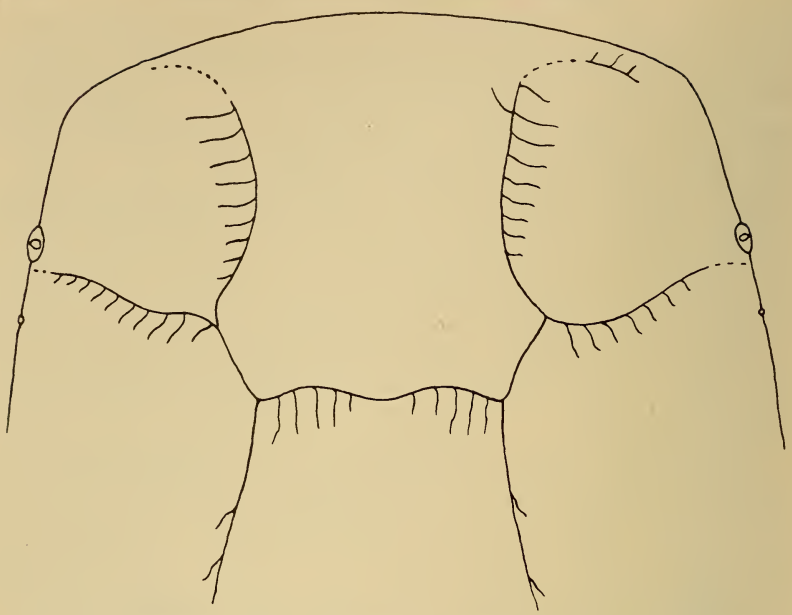

FIG. 2.—*Rhineodon typus.* Dorsal view, cephalic mucus canals. Dotted portions not actually traced on the skin.

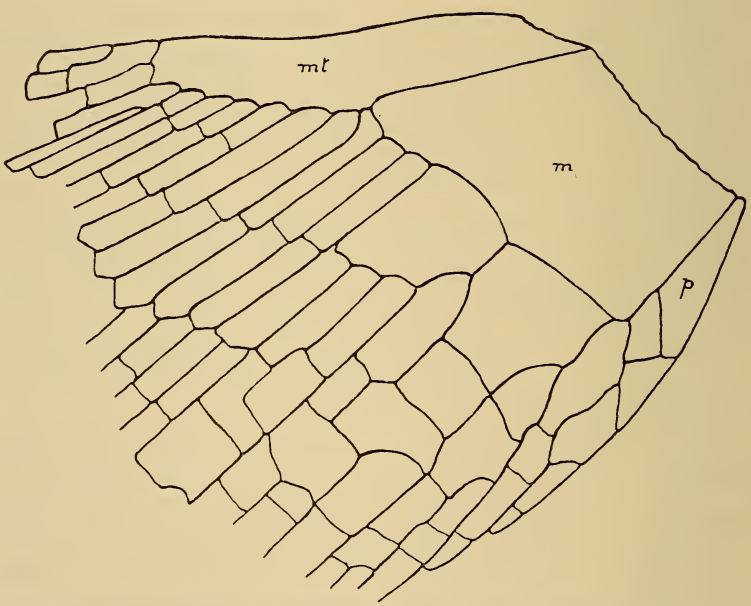

FIG. 3.—*Rhineodon typus.* Skeleton of pectoral fin. *p*, propterygium; *m*, mesopterygium; *mt*, metapterygium.

Though Garman's statement (Plagiostomia, 1913, p. 41) that oro-nasal grooves are present is thus shown to be incorrect, the absence of these grooves supports Garman and White in their contention that *Rhineodon* is not an Orectolobid, in which family Tate Regan placed it (P.Z.S., 1906, p. 745, and 1908, p. 352).

Rostral Cartilages.—As might be expected, the rostral cartilages are completely obsolete. The anterior margin of the skull follows an even, slightly convex course between the olfactory capsules.

Pectoral Fin (fig. 3).—The propterygium is well developed and excludes the mesopterygium from the margin of the fin. The mesopterygium is extraordinarily broad. The absence of a foramen between the mesopterygium and metapterygium is a further point against the inclusion of *Rhineodon* in the *Orectolobidae* (Regan, P.Z.S., 1906, p. 744).

Simocephaly in *Pagrus laniarius*.

(Text-fig. 4.)

Recently Mr. C. L. Biden obtained in Kalk Bay, False Bay, a specimen of *Pagrus laniarius*, locally known as the "Panga." It is 270 mm. in length, and is a typical *laniarius*, except for the profile of the forehead and snout. The profile somewhat resembles that of the large *Dentex undulosus* figured in Ann. S. Afr. Mus., xxi, p. 720, fig. 26, but when compared with the normal *laniarius* profile (*loc. cit.*, fig. 24) it is seen that the "pug-nose" shortening of the snout has been carried almost to an extreme. As a consequence of this simocephalous development, the cleft of the mouth has become nearly vertical. The lower margin of the pre-orbital on the left side is unusually concave, while that on the right side is biconcave. There are only 4 canines in the lower jaw, and the molars are reduced in number in both jaws. The specimen is a ♀ with half-ripe ovaries.

Among the local fishermen this form of Panga is known as the "Dik-bek" Panga, which may be rendered in English as the "Pug-nosed" Panga. Mr. Biden informs me that it used to be common on the deeper banks in False Bay, but within the last twenty years has become very scarce. At Port Elizabeth the name is applied to the ordinary "long-nosed" or "pig-nosed" Panga.

Later Mr. Biden has qualified his statement as to its rarity by obtaining from the Kalk Bay fishermen two more specimens. These are very interesting as showing successive stages in simocephaly. The largest, a 300-mm. ♀, has an almost normal profile, but with

a marked indentation opposite the nostrils. The snout is not much shortened, and the cleft of the mouth normal. The other specimen, a 275-mm. ♂, is intermediate between the larger ♀ and the smaller

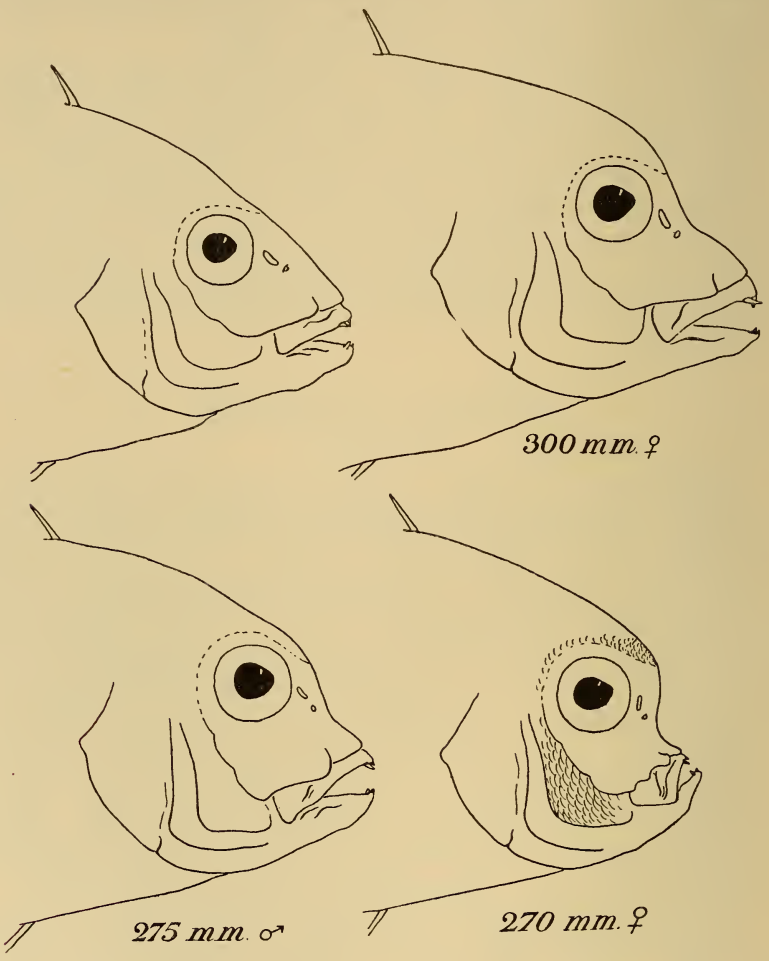

FIG. 4.—*Pagrus laniarius* C. and V. Profiles of normal head and three heads showing successive degrees of simocephaly.

pug-nosed specimen. The snout is distinctly shortened and the cleft of the mouth is oblique. Both these specimens have the normal 6 canines in the lower jaw.

As the greatest amount of simocephaly is shown by the smallest of the three specimens, it must not be assumed that every individual showing a tendency to simocephaly would eventually in the course

of its existence develop into the extreme pug-nosed form. On the contrary the series seems to indicate that the tendency to simocephaly varies in intensity, and that by cross-breeding all gradations from pug-nose to pig-nose are possible (see Gudger, Bull. Amer. Mus. Nat Hist., 61, 1930, p. 18).

Mola mola and *lanceolata*.

(Text-figs. 5–7.)

Since 1927 the following records of these two Sun-fishes, either stranded or captured, have accumulated:—

(*mola*) January 1929. Table Bay.
(*lanceolata*) March 1930. Table Bay.
(*mola*) August 1931. Table Bay.
(*mola*) December 1931. Camps Bay, west coast of Cape Peninsula.
(*mola*) 12th October 1933. Table Bay.
(*mola*) 27th ,, ,, ,,
(*mola*) December 1933. East London.
(*mola*) July 1934. Kommetje, west coast of Cape Peninsula.

As regards the distinctions between the two species the following points deserve attention:—

A cross-section through the body at the region of the pectoral fin shows in *mola* an elongate hexagonal outline with slightly hollowed lateral sides (fig. 5, *b*). The angles formed by the inclination of the dorso-lateral and ventro-lateral sides with the lateral sides are distinct in the large mounted specimen in the South African Museum measuring 7 feet, but can also be observed in the smaller specimen measuring 3 feet 3 inches (from middle of tail to point of snout).

In contrast to this, *lanceolata* shows a narrow oval-lanceolate outline, widest dorsally and narrowing evenly towards the ventral line (fig. 5, *c*). This outline is constant in two mounted specimens measuring 4 feet 7 inches and 3 feet 11 inches, and in a cast measuring 6 feet 1 inch in length.

Both specimens of *mola* possess a short snout projecting beyond the mouth. A straight line drawn from base of pectoral through middle of gill-opening and eye leads to the apex of this projection. In the specimens of *lanceolata* there is no such projection, the lower jaw forming the most anterior point of the body.

The relative positions of the pectoral fin and the gill-opening show a constant difference in the two species. In *mola* there is a

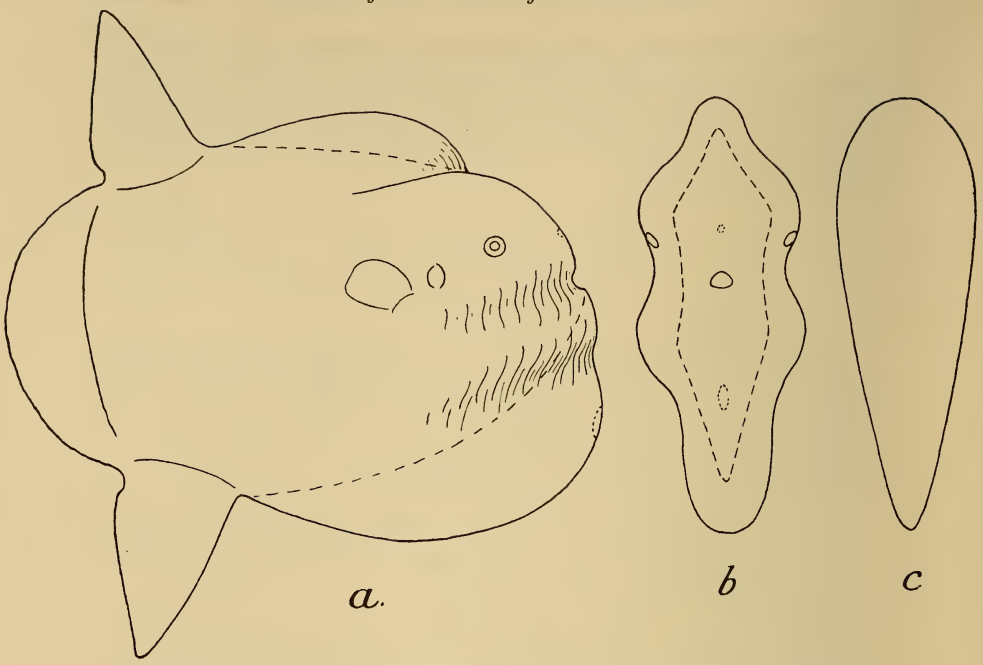

Fig. 5.—*a*, Outline of the Kommetje 1934 Sun-fish; the broken line represents the outline of a normal specimen. *b*, Cross-section of same, the broken line being the normal cross-section in *M. mola*. *c*, Cross-section of *M. lanceolata*.

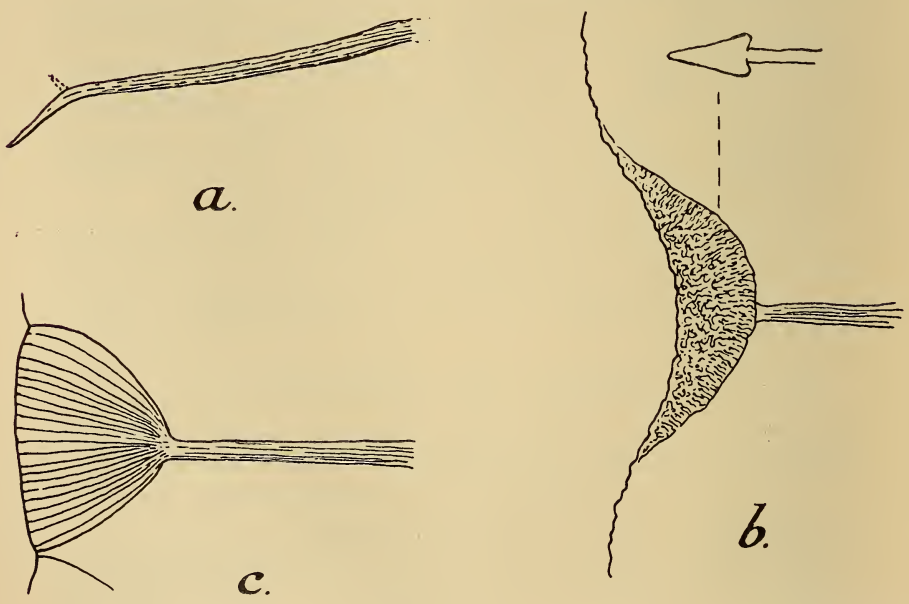

Fig. 6.—Caudal fin-ray of: *a*, *Mola lanceolata*; *b*, *M. mola*, with cross-section; *c*, *Ranzania truncata*. I *a* and *b* the overlying skin removed.

strip of roughened skin between the anterior end of the base of the fin and the posterior edge of the gill-opening; in *lanceolata* there is no such strip, the pectoral fin arising immediately behind the opening. In the cast specimen already mentioned the curved hind margin of the gill-opening even extends behind the anterior end of the pectoral base.

The gill-rakers in *mola* resemble those in *lanceolata*, being concealed beneath thick fleshy skin. (Gill-filaments, see below.)

The caudal fin in *mola* is always rounded-truncate, and more or less scalloped, the indentations being for the most part regularly spaced. At the bottom of each indentation there is a thickening or callosity, visible at least in mounted specimens. In the large specimen there are 10 indentations, in the smaller one 13, definitely on the caudal region and excluding those on the transitional regions between the tail and the dorsal and anal fins. It has been suggested that this truncation and scalloping of the tail is due to injury inflicted on the young Sun-fish. The regularity of the conformation, however, precludes this explanation.

If a dried specimen of *Ranzania truncata* be examined the extraordinary shape of the caudal fin-rays can be easily seen, and also their gradual transition from the normal fin-ray of the dorsal and anal fins. In the caudal fin the ray has a slender basal stalk which suddenly expands like a fan or Borassus palm leaf (fig. 6, *c*).

In *lanceolata* only those fin-rays at the junctions of the dorsal and anal fins with the caudal fin exhibit a fan structure, those in the caudal fin proper having only a slender stalk which peters out near the fin margin, occasionally with an indication of a small fork (fig. 6, *a*). In *mola* each of the caudal fin-rays terminates in crescentic osseous callosity situate at the notch between each pair of caudal lobes (fig. 6, *b*). These callosities may not be prominent in fresh specimens, but in mounted specimens the surrounding skin shrinks so much that they are easily traceable. In *mola*, as in *lanceolata*, the fin-rays between the caudal and the dorsal and anal fins show fan structure.

The general shape of the tail is constant also in *lanceolata*, though the position of the actual point of the tail may vary, thus causing differences in the relative obliquity and lengths of the upper and lower margins. Dissection of the whole tail region of this species might prove interesting.

The 1934 Kommetje specimen, though obviously a specimen of *mola*, was a freak of most extraordinary appearance (fig. 5, *a* and *b*). Its chief measurements were as follows: length, 6 feet 4 inches; depth

between anterior ends of bases of dorsal and anal fins 3 feet 10 inches, these two fins respectively 1 foot 9 inches and 2 feet in length, and distance between their tips 7 feet. The tail was evenly convex, showing none of the usual indentations.

In profile the anterior part of the body was pear-shaped, caused by the enormously swollen dorsal and ventral ridges. In addition there were two broad ridges on either side, and perfectly symmetrical on the two sides, one above and one below the eye. A comparison of the cross-section (fig. 5, *b*) with that of a normal specimen shows that these latter ridges correspond with the angles of the hexagonal cross-section, and are merely due to an excessive hypertrophy of the dermis.

Apart from the abnormal growth on the chin, the profile of the mouth and forehead regions is normal, but resembles that of *lanceolata* in having no projecting snout. There is, however, a small circular hollow, in a position corresponding with that of the point of the snout, which apparently is the scar of an osseous tubercle which has been broken off (corresponding with the nasal spine in the larval form). A similar larger oval hollow occurs on the throat region, where in both the mounted specimens in the South African Museum is situated an osseous tubercle or callosity. In *lanceolata* there is no trace of this throat callosity. (See note, p. 658.)

The Table Bay 1930 specimen of *lanceolata*, when freshly taken from the water, was black above as far down as a line joining the eye and the posterior end of base of dorsal fin, silvery below, especially bright on the belly, with a number of small, round, rather ill-defined black or brown spots below the pectoral region.

Gill-filaments.—In December 1933 a strange fish was washed ashore at Cintsa, near East London. From a sketch and the dimensions taken at the time, I had no hesitation in identifying it as *Mola mola*. The fish was buried, but after about three months was dug up. In the slimy mass some very decomposed pieces of the shoulder girdle were found, and also a large number of thin knife-like bones, which were forwarded to me for inspection by Mr. W. L. Wright, Hon. Secretary of the East London Angling Club. The teeth were not found, having probably been removed by the person who buried the fish.

The knife-like bones were a puzzle at first, until it occurred to me to dissect a very old and partially decomposed specimen of *Ranzania truncata*. Similar shaped bones were found, and proved to be the supporting rods of the gill-filaments.

The accompanying figure (fig. 7) shows the structure of these specimens, which measured 55–85 mm. in length. The base is enlarged into a hollowed articular surface, which fits on to the gill-arch. The "back" of the knife is shallowly grooved in the proximal half, the margin near the base showing finely corrugated striae. The blade shows irregularly spaced growth lines; the base and tip are

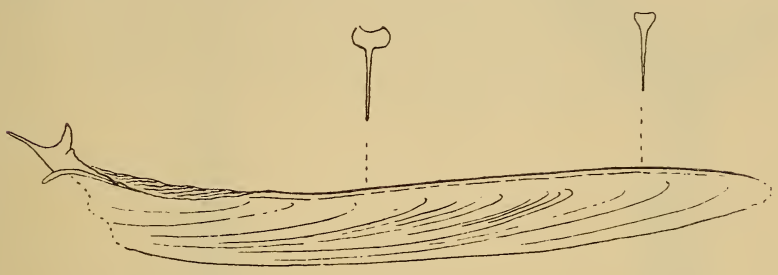

Fig. 7.—*Mola mola*, bone supporting rod of gill-filaments. (Slightly enlarged.)

incomplete in all the specimens. The apices of most of the specimens show a sagittal splitting of both "back" and blade into two halves.

The main reason for illustrating these bones is their interest from an anthropological as well as an ichthyological point of view. Mr. A. J. Goodwin, Department of Anthropology of the University of Cape Town, tells me he has found similar bones in some of the cave deposits he has investigated. The resistant quality of these bones, as opposed to that of the other bones of the Sun-fish, may well ensure their preservation in the moderately dry and well-drained kitchen-middens left by the Strandloopers or early natives. Mr. Goodwin kept no specimens, and if he had it would probably have been impossible to identify them as belonging to any particular kind of fish. Only the size might be some indication.

Ranzania truncata (Retzius).

1927. Barnard, Ann. S. Afr. Mus., xxi, p. 989, fig. 32 (references).

Two further specimens of this species have come to hand and may be recorded:

Inner Basin, Cape Town docks (alive), 23rd December 1932.

Kommetje, Cape Peninsula (washed ashore), 23rd August 1934.

The stomach of the latter specimen contained a large number of the *Megalopa* stage of the common Shore-crab *Plagusia chabrus*.

EXPLANATION OF PLATES.

Rhineodon typus A. Smith.

Pl. XXIII.—Dorsal and lateral views of the half-scale model constructed for exhibition in the South African Museum.

Pl. XXIV.—Gill-slits of the right side, showing the 4th gill-slit extending below the origin of the pectoral fin. Photo of the flattened skin, head end above, mid-dorsal line to left, cut ventral edge to right.

Pl. XXV.—Upper jaw and nostril of the right side from in front (upper figure), from below (lower figure).

Since this paper was in the press, I have received, through the kindness of Mr. J. R. Norman of the British Museum, a tracing of Ranzani's figure of *Orthragoriscus alexandrini* (1839, Nov. Comm. Ac. Sc. Inst. Bonon., iii). This figure closely resembles the Kommetje Sun-fish, having an evenly rounded tail, and prominent convexities on the throat and the forehead, especially on the latter. But neither of these prominencies is so strongly developed as in the South African specimen.